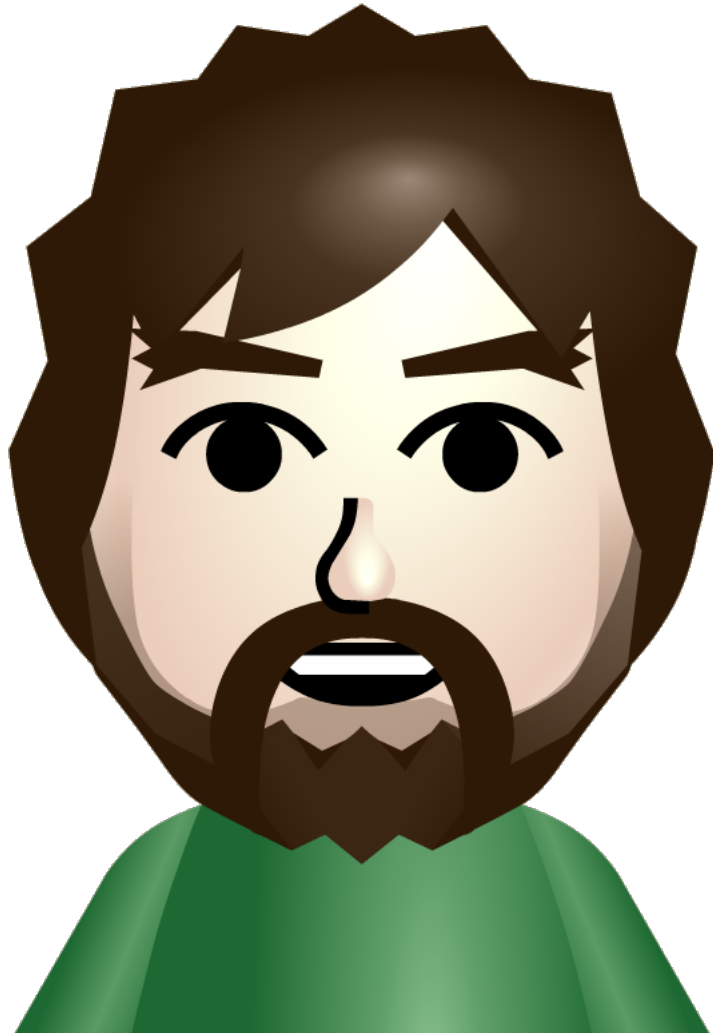


# Real-World Yocto

Getting the most out of your build system

Stephano Cetola, Intel Open Source Technology Center





# whoami?

**Stephano Cetola**

Intel Open Source Technology Center



3:00pm	Pavilion East	Real-World Yocto: Getting the Most out of Your Build System - Stephano Cetola, Intel
4:20pm	Pavilion West	poky-tiny and Beyond, or Trying to put the Yocto in Yocto Project - Scott Murray, Konsulko

### WEDNESDAY

11:05am	Broadway III	Learn Bitbake with Yocto Project - Tom King, Linux Foundation (E-ALE) (2hrs)
3:30pm	Grand Ballroom 1	Living on Master: Using Yocto Project, Jenkins and LAVA for a Rolling Release - Tim Orling, Intel
3:30pm	Galleria North	DIY Connected IoT Products using Open Source Software - Alan Bennett & Tyler Baker, Open Source Foundries
4:30pm	Grand Ballroom 1	Building Images with Yocto Project - Tim Orling, Intel (E-ALE) (2hrs)

### THURSDAY

all day	offsite	Yocto Project Developer Day, sponsored by Mentor Graphics - sign up now!
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## YOCTO PROJECT® DEV DAY NORTH AMERICA 2018

The Yocto Project is happy to announce Yocto Project Developer Day taking place at Mentor Graphics, Wilsonville Oregon, USA, on March 15th, 2018. This is the day following the Embedded Linux Conference being held at the Hilton in downtown Portland Oregon, so make your plans to leave a day later and learn more about Yocto Project's open source, high-quality infrastructure and tools.

**Date:** Thursday, March 15

**Time:** 9:00am – 5:00pm

**Location:** Mentor Graphics (Wilsonville, OR)

\* Transportation will be provided from the Portland Hilton.

**Registration Cost:**

\$249

You'll get a dev board: MinnowBoard Turbot, Dragon Board or Beagle Board.



# The Yocto Ecosystem

## Poky

<http://git.yoctoproject.org/cgit.cgi/poky/>

## Continuous Integration

<https://autobuilder.yoctoproject.org>

## Tested Images & SDKs

<https://downloads.yoctoproject.org/>

## Patch Tests & Bug Tracking

<https://patchwork.openembedded.org/>

<https://bugzilla.yoctoproject.org/>

## Ready-made Recipes

<http://layers.openembedded.org>



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# Levels of Separation

## DISTRO

musl

systemd

x11

## MACHINE

kernel

bootloader

drivers

## RECIPE

scripts

applications

support

## IMAGE

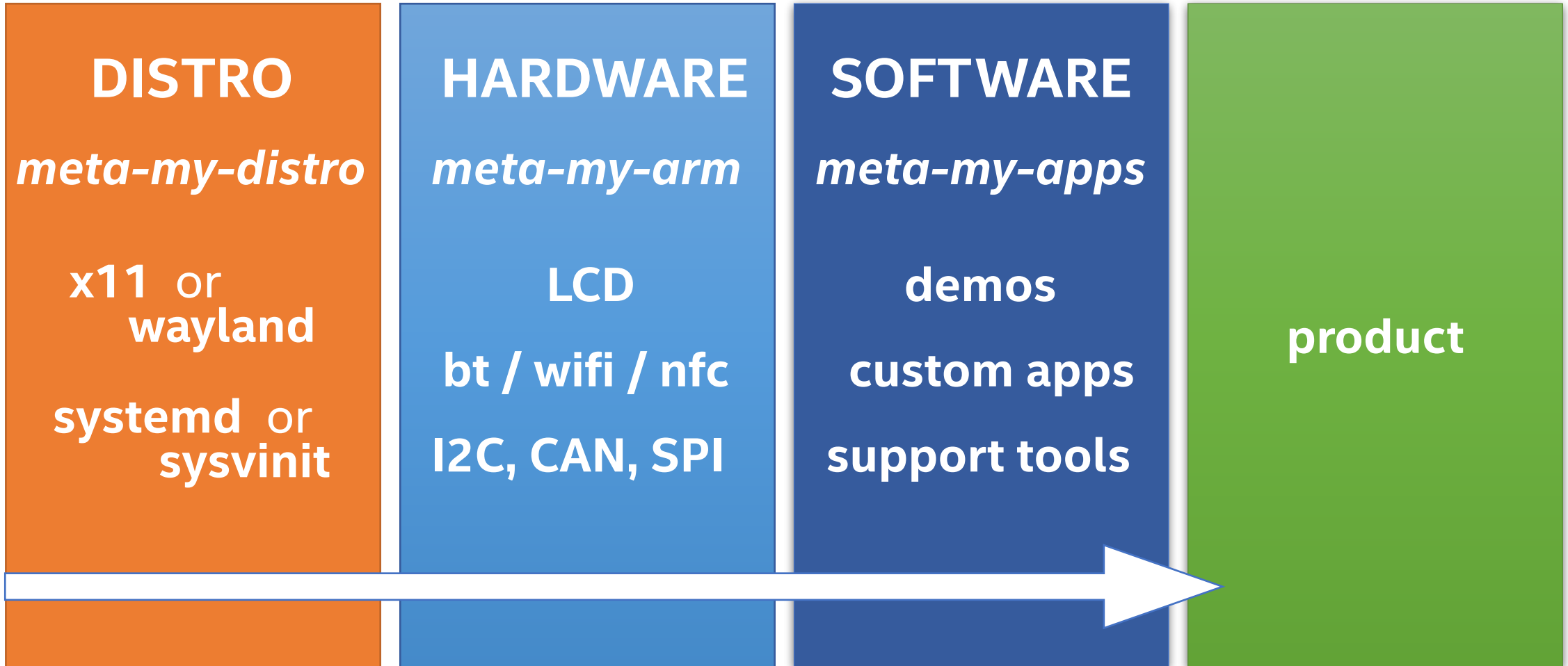
console

manufacturing

kiosk web ui

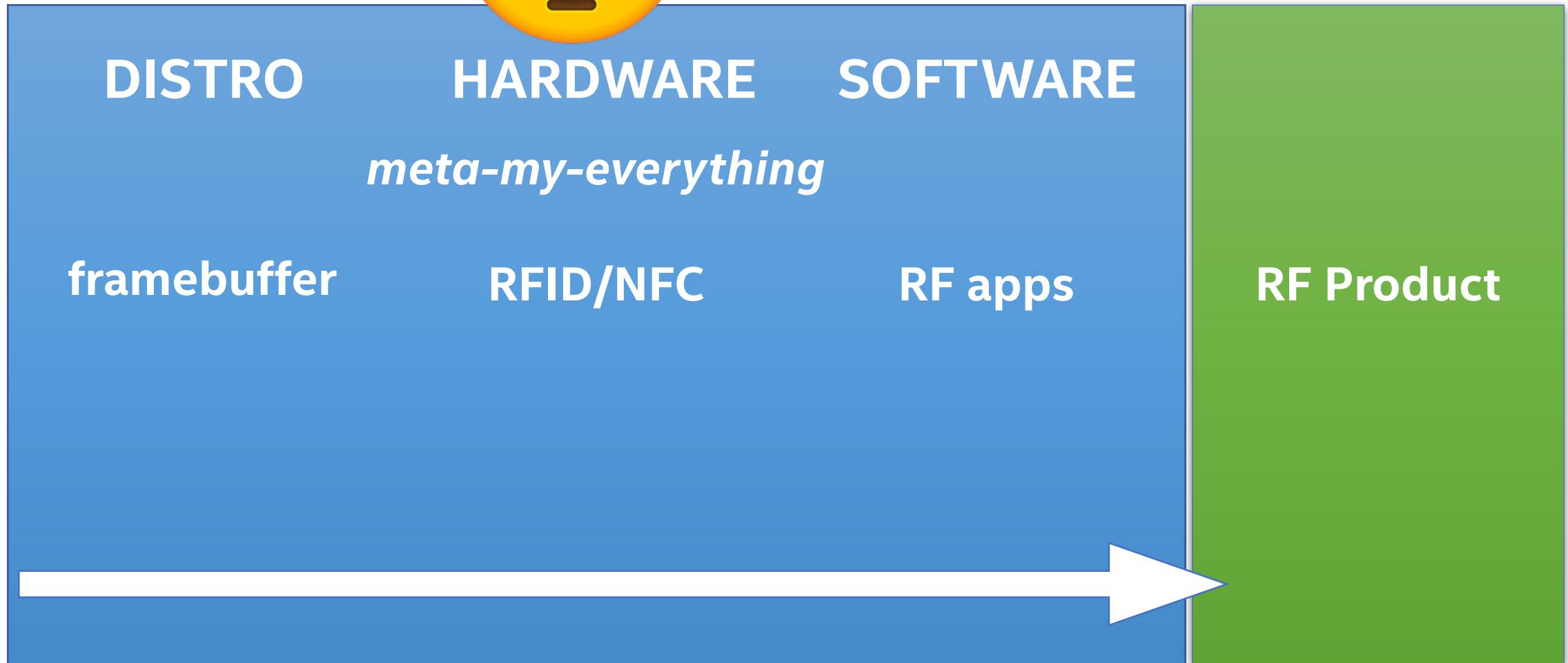


# Layers of Separation



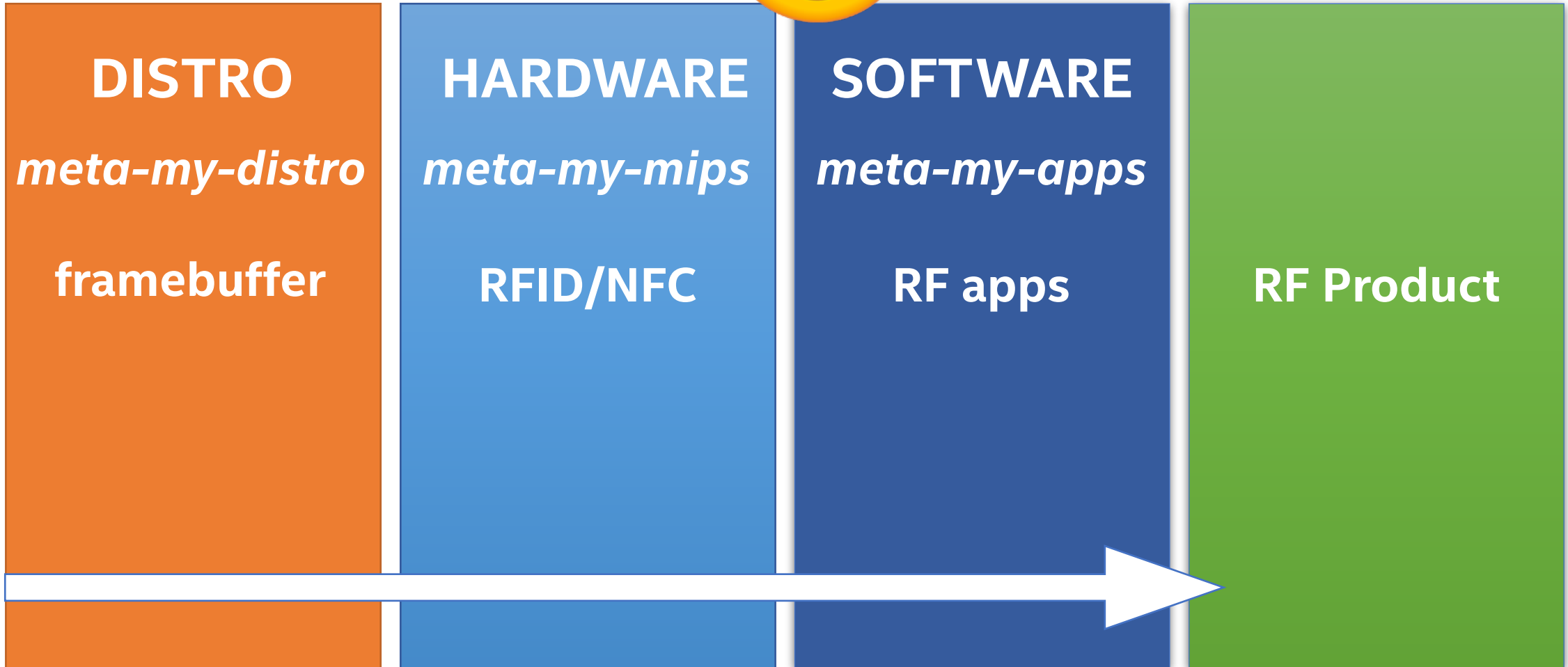


1 Layer =  Future You



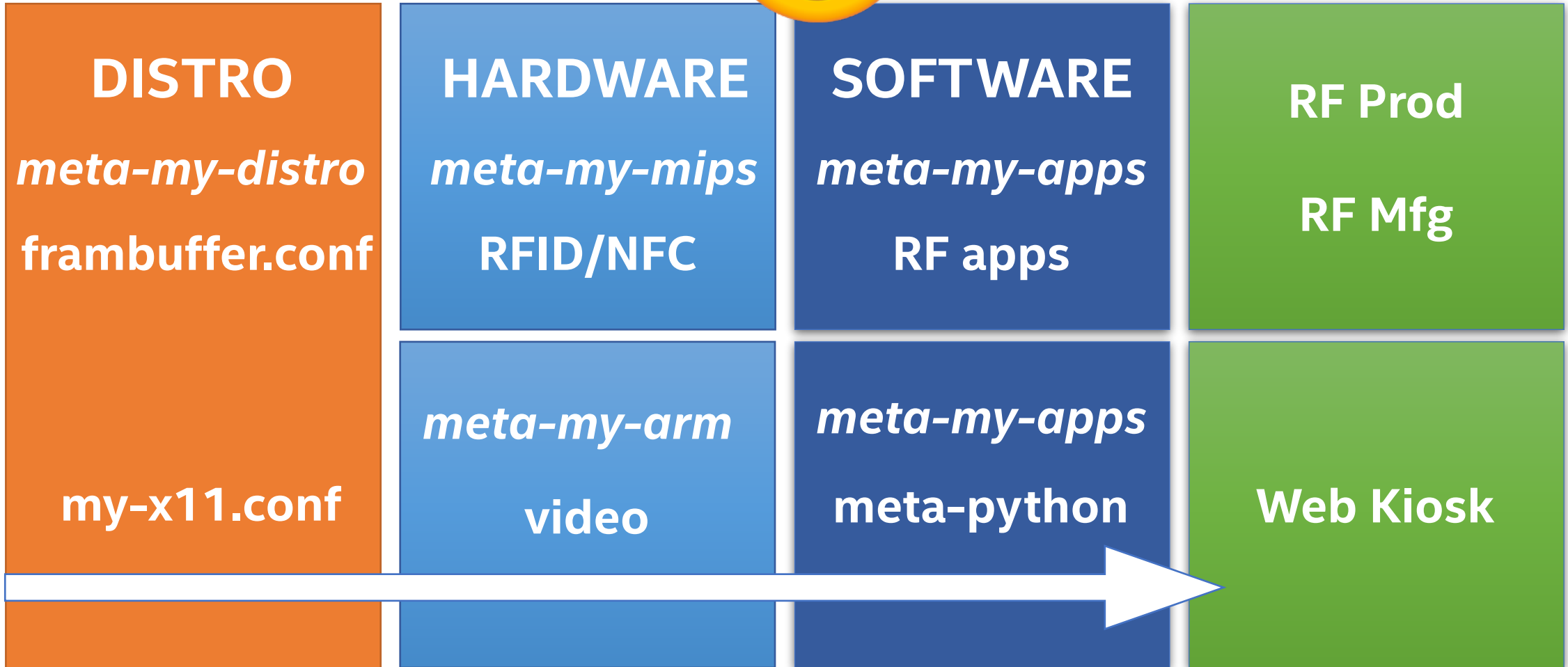


# Multiple Layers = Future You





# Multiple Layers = Future You





# Things I Wish I'd Known



# Bootable Image Formats

- **IMG / ISO / HDDIMG**
  - ext3 / ext4
  - ISO 9660 / Bootable "CD"
  - HDDIMG adds initramfs & install
  - HDDIMG will be going away
- **WIC**
  - **Customize**
    - WKS, partitions, media
  - **Interact**
    - wic cp, rm, ls, write
  - **Use bmap-tools**





## Set Downloads & SSTATE Dirs

DOWNLOAD\_DIR = /share/downloads

SSTATE\_DIR = /opt/yp/sstate

### Tips:

rsync or NFS downloads

site.conf

SSTATE\_MIRRORS



"Back in Time for February.....just" flickr photo by The Manic Macrographer shared under a Creative Commons (BY) license



## Use a Pre-Built SSTATE

Use the correct git tag for your releases:

branch  $\Rightarrow$  rocko = development

tag  $\Rightarrow$  2.4.1 = release

### Our SSTATE Mirrors

- <http://sstate.yoctoproject.org/dev/PATH;downloadfilename=PATH>
- <http://sstate.yoctoproject.org/2.4/PATH;downloadfilename=PATH>
- <http://sstate.yoctoproject.org/2.4.1/PATH;downloadfilename=PATH>

### A side note to Yocto Project member organizations:

What if Yocto Project could host your SSTATE

Is your company a platinum member?

<https://www.yoctoproject.org/ecosystem/member-organizations>



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# Even Faster with Package Feeds

## Generate Package Feeds

```
EXTRA_IMAGE_FEATURES += "package-management"  
PACKAGE_FEED_URI = "http://...packagerepos/release"
```

## Version your packages

```
PRSERV_HOST = "<host>:<port>"  
$ bitbake-prserv --host <host> --port <port> --start
```

## Share your repo

- install lighttpd (twisted -n web)
- `ln -s /tmp/deploy/rpm <your-http-folder>`
- **bitbake package-index** as needed

## Sign your packages

<http://www.yoctoproject.org/docs/current/dev-manual/dev-manual.html#generating-and-using-signed-packages>

Use rpm or opkg or **live on the edge**



"Kitten" flickr photo by Stig Nygaard shared under a Creative Commons (BY) license



## Introspect your image

### Why is this file on my board?

1. `oe-pkgdata-util find-path /bin/sh`
2. `git grep`
3. `dnf whatprovides`
4. dynamic install - scripts
5. IRC is your friend `#yocto @ freenode`

### How do I change this config file? (easy)

`recipetool appendfile`

### Where is my dependency tree?

`bitbake -g my-image-name`

*\*see `oe-depends-dot`*





## Bitbake Options

**-k** (--continue)

do not stop on error

**-g** (--graphviz)

graph dependency tree

**-e** (--environment)

bitbake -e | less

**-C** INVALIDATE\_STAMP

specific clean (e.g. unpack)





## There's a script for that...

### bitbake-layers

- find/create/remove layers

### devtool

- <https://youtu.be/CiD7rB35CRE>

### oe-depends-dot

- examine output of "bitbake -g"

### bitbake-dumpsig/diffsigs

- learn why bitbake is rebuilding recipes
- examine why task hashes have changed

### buildhistory-diff

- examine buildhistory for changes in:  
*epoch - version - revision*







Your open source project needs YOU!

**create-pull-request**

**send-pull-request**



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@stephano

Questions?

